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Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The specification has been amended to eliminate some minor obvious errors and to place US-style headings in the case as well as the statutory cross-reference paragraph. In addition, the claims have been amended to overcome the §112 rejections. No new matter whatsoever has been added.

The claims are rejected on applicant's earlier patent, US 4,651,508 of Hannen (hereinafter Hannen '508). This reference shows, as described in column 3 at lines 10ff, an air-curtain device comprised of a nozzle 17 above the object being wrapped and to one side of it that directs air streams 22 crosswise horizontally above the object to an intake grate 20 of an exhaust fan 31. The intent here is to eliminate the hot air rising around the object 2.

There is no discussion anywhere in this reference of a foil "projecting vertically past an end of the stack" as defined in the preamble of claim 1, and the air curtain 22 of Hannen '508 is clearly to widely spaced from the object 12 to have any effect on it even if there were one. Furthermore the nozzle 17 of Hannen '508 is not "centered vertically on the stack" but is clearly to

one side of it, and it has nothing resembling an "annular array of outlets." Because of these structural differences, Hannen '508 cannot be used to form a valid §102 rejection of amended main claim 7.

Since the air curtain formed by the jets 22 serves purely to carry off hot air rising convectively around the object 12 being packet, it would not be obvious or logical to use it for another purpose, especially when no other problem or purpose is mentioned in the application. Not only would the system of Hannen '508 not work to stand up a foil end as it is heated, so that it shrinks back smoothly, but there is not a scintilla of suggestion in Hannen '508 that this could or should be done, or that there is even any problem with how a projecting end portion, which apparently does not exist with this system is dealt with. A §103 rejection on Hannen '508 is similarly impossible.

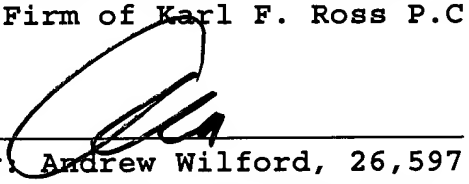
The other cited but not applied reference, US patent 4,616,471 also of Hannen (hereinafter Hannen '471), is even further afield. It has a blower 20 that draws air in, not out, and that serves to pull in any lower overhanging portion. Thus the blower 20 of Hannen '471 operates oppositely to the nozzle system of this invention. Thus at best Hannen '471 teaches away from the instant invention. This reference adds nothing to the teachings of Hannen '508 that could form a valid §102 or §103 rejection.

The remaining cited but not applied references are no better than Hannen '508.

For these reasons all the claims in the case are clearly in condition for allowance. Notice to that effect is earnestly solicited.

If only minor problems that could be corrected by means of a telephone conference stand in the way of allowance of this case, the examiner is invited to call the undersigned to make the necessary corrections.

Respectfully submitted,
The Firm of Karl F. Ross P.C.



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Enclosure: Substitute Specification
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~~Transl. of WO 00/44626~~

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AU 3721

Apparatus for Shrinking a Heat-shrink Foil

XREF → F01

The invention relates to an apparatus for shrinking a heat-shrink foil in particular wrapped around a palleted stack of objects.

B01

Such heat-shrink foils are used nowadays in order, for example, to secure objects for example to a pallet for transport. To this end a heat-shrink foil is wrapped around the stack of objects so that the heat-shrink foil does not slip down. This is done either directly in a shrink station or in a separate station upstream of the shrink station.

In the shrink station the heat-shrink foil is blasted by the shrink device with hot gas so that the heat-shrink foil is heated to its shrink temperature and is shrunk so as to pull together around the stack of objects. The shrink device is thus movable vertically up and down so that shrinking can take place from top to bottom or from bottom to top. During shrinking air is blow partially on the stack of objects from above.

US patent 4,616,471 describes an apparatus for shrining a heat-shrink foil forming a hood over a palleted object stack that is formed of at least one shrink device movable vertically up and down on a frame, the heat-shrink foil projecting past the lower face of the object stack.

A disadvantage is that this apparatus cannot produce a fold-free shrinking of the portion of the heat-shrink foil that

projects above the top of the stack of objects so that for example a packing slip on the upper side of the stack of objects between the stack of objects and the heat-shrink foil, which carries a bar code, cannot be read.

001

It is an object of the invention to improve on an apparatus of the described type so that shrinking of the portion of the foil projecting upward and/or downward is improved to produce an optimal fold-free shrink.

S01

This object is attained by an apparatus for shrinking a heat-shrink foil wrapped in particular about a palleted object stack comprising at least one shrink device movable vertically up and down on a frame to heat and vertically shrink the heat-shrink foil, the heat-shrink foil projecting past the upper and/or lower edge of the object stack to form an upper and/or lower shrink formation, characterized in that the apparatus further comprises at least one nozzle connectable to a compressed-gas, especially a compressed-air source and aimed centrally above and/or below the object stack and generally vertically directed thereat, each nozzle having outlet openings that extend at an angle not coinciding with the flow direction inside the nozzle and that are in an annular array.

As a result of the angle of the outlet openings of the nozzles to the flow direction, the compressed air is not blown perpendicularly against the upper face of the object stack. Rather the compressed air is directed either obliquely against the upper

surface and is there deflected against the projecting part of the foil, or -- so long as the outlet openings open generally at a 90° angle to the flow direction inside the nozzle -- is blown directly against the projecting foil part. As a result the projecting foil part is held up during the upper shrink phase so that it is uniformly heated by the shrink device during this upper shrink phase.

As a result of this uniform heating the projecting foil part shrinks without folds onto the upper side of the object stack.

Preferably each nozzle has a beveled end face in which the outlet openings are provided so that the compressed air is directed at this angle in all directions. The outlet openings extend generally at an angle of 45° to the flow direction in the nozzle.

In order that object stacks of different size can be provided with a shrunk foil in the shrink station, each nozzle is movable up and down. As a result the ideal spacing between the nozzle and the object stack can be set for the height of the object stack and/or the dimension of the upper face of the object stack.

8000

In the following an embodiment shown in the drawing is described. Therein:

FIG. 1 is a side view of an apparatus according to the invention;

FIG. 2 is a view through the output part of a nozzle; and

FIG. 3 is a section through the structure of FIG. 2.

SD

In the figures the same reference numerals are used for the same parts.

FIG. 1 shows a shrink station 1 that is formed of a frame 2 and a shrink device 3, e.g. constituted as a ring burner.

The frame 2 has two masts 4 arranged next to another in a plane perpendicular to the view plane and of which only the front one is visible in this view. Both masts 4 are connected together at their upper ends by an unillustrated traverse.

Each mast 4 carries a vertically movable carriage 5 guided by rollers 6 and 7. The carriages 5 are moved vertically by endless chains 8 looped at the upper and lower ends of the masts 4 over sprockets 9 and 10.

A motor 11 provided in the lower region of the masts 4 drives the chains 8, both carriages 5 being moved synchronously so that they are always at the same height.

The carriages 5 are connected together by the shrink device 3 which has a shape corresponding to the footprint of a stack 12 of objects -- in the illustrated example a polygonal frame-like shape -- where the area inside the shrink device 3 is large enough that it can be moved vertically along the object stack 12.

Such an object stack 12 is underneath the shrink device 3 on a conveyor 13 that is formed for example as a chain, roller, or bar conveyor. The object stack 12 is comprised of a standard pallet 14 and a stack 15 of objects 15 on it. If objects 15 of substantial size need to be packaged, no pallet 14 is needed.

Underneath the object stack 12 is a lift platform or device 16 on whose upper side a lift ram 17 can engage through an aperture in the conveyor 13 upward between the unillustrated support members of the pallet 14. A suction blower can be provided in the region of the ram 17 and underneath the conveyor 13.

Above the object stack 12 is a nozzle 19 that can also move up and down. The nozzle 19 is as shown in FIG. 2 of blunt shape and has an annular beveled edge face 20 that extends at an angle of about 45° to the flow direction inside the nozzle 19. Openings 21 in this edge face 20 direct jets of compressed air at an angle at the object stack 12 (arrow 22). As shown in FIG. 3 the outlet openings 21 extend like a star from a supply passage 23 provided centrally in the nozzle 19.

When the compressed air strikes the upper side of the object stack 12 it is deflected as shown by arrows 24 and stands up and holds erect a projecting portion 25 of a heat-shrink foil 26. In addition the compressed air coming from the nozzles 19 directs hot air from the shrink device 3 to the inside of the projecting

portion 25. The shrink device 3 is supplied with gas via a supply line 27.

When the nozzles 19 are only as shown provided shrinking, the outlet openings 21 are provided in an annular array around the face 20 as shown in FIG. 3 so that the compressed air moves outward in all directions. If on the contrary several nozzles 19 are provided, the outlet openings 21 of each nozzle 19 are preferably set such that each nozzle 19 directs its compressed air only at a particular portion of the object stack 12; at the same time the arrangement of the outlet openings 21 among the provided nozzles 19 is selected such that the projecting foil portion 25 of the heat-shrink foil 26 is stood up at every location by the compressed air.

Shrinking with the apparatus according to the invention takes place as follows:

First the object stack 12 is wrapped or wound with the heat-shrink foil 26. This can be done for example at a station upstream from the shrink station 1 or in the shrink station itself. When the wrapping takes place in a separate station the object stack 12 surrounded by the heat-shrink foil 26 is transported by the conveyor 13 to the shrink station 1.

To both sides of the conveyor 13 are standard vertical foil rollers for applying the heat-shrink foil 26, from at least

one of which the heat-shrink foil 26 rolls out. The two ends of the heat-shrink foils 26 pulled off the foil rolls are welded together. On passing the foil rolls, the object stack 12 is surrounded by the welded-together heat-shrink foils 26, the two heat-shrink foils 26 being joined together at the trailing region with a double weld seam.

Thereafter the heat-shrink foils 26 are cut apart between the two weld seams so that the next object stack 12 can be provided with a heat-shrink foil 26. The heat-shrink foil 26 engages the object stack 12 such that it does not slide down. It is possible to provided the object stack 12 in another manner with the heat--shrink foil 26.

In the shrink station 1 the heat-shrink foil 26 is shrunk by vertical movement of the shrink device 3. It is preferable that the shrinking takes place from top to bottom although shrinking in the opposite direction is possible.

In order to achieve a good shrinking in the upper region, that is in order to shrink the foil portion 25 projecting up above the object stack 12, compressed air is blown via the nozzles 19 against the upper surface of the object stack 12. The compressed air engages obliquely down on the object stack 12 (arrow 22) and is deflected thereby back up in the direction of the arrows 24. In this manner the projecting foil portion 25 is pushed outward and

upward so that during the upper shrink phase it is erect and thus is uniformly heated by the hot gas from the shrink device 3.

As soon as the projecting foil portion 25 is heated to the shrink temperature, air feed to the nozzle 19 is cut so that the projecting foil 25 portion draws itself over the upper surface of the object stack 12.

Thereafter the shrink device 3 is moved downward to shrink the side surfaces of the object stack 12, so that the heat-shrink foil 26 pulls strongly together over the side surfaces of the object stack 12.

If shrinking underneath is desired, that is to engage the lower edge of the heat-shrink foil 26 around the object stack 12 or the pallet 15, the object stack 12 is raised somewhat by the ram 17 of the lifting device 16.

Then the shrink device is dropped down to the level of the conveyor 13 by movement of the carriages 5.

Now the lower edge of the heat-shrink foil 26 is acted on by the hot gas of the shrink device 3 so that it is heated to the shrink temperature and thus pulls tight around the lower face of the pallet 14. This drawing together can be assisted by an unillustrated suction fan.

Thereafter the object stack 12 with a still hot edge of the heat-shrink foil 26 is again set back down on the conveyor 13

so that the hot edge is pressed between the conveyor 13 and the lower surface of the pallet 15 so as to weld together the various layers of this edge. Thus the lower edge of the heat-shrink foil 26 gains an extremely good hold.

After the shrink process is over, the object stack 12 is moved out of the shrink station 1 by the conveyor 13. The above-described process is repeated for a new object stack.